

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Shiro TAKAGI

Title: IMAGE FORMING APPARATUS
AND IMAGE PROCESSING
APPARATUS FOR PRINTING
CODE PATTERN AND METHOD
FOR PRINTING CODE PATTERN

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UTILITY PATENT APPLICATION
TRANSMITTAL

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Box PATENT APPLICATION
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 C.F.R. § 1.53(b) is the nonprovisional utility patent application of:

Shiro TAKAGI

Enclosed are:

- ☒ [X] Specification, Claim(s), and Abstract (21 pages).
- ☒ [X] Informal drawings (6 sheets, Figures 1-7).
- ☒ [X] Unexecuted Declaration and Power of Attorney (3 pages).
- ☒ [X] Information Disclosure Statement.
- ☒ [X] Form PTO-1449 with copies of 1 listed reference(s).
- ☒ [X] Claim for Convention Priority w/ 1 certified document

The filing fee is calculated below:

	Claims as Filed	Included in Basic Fee	Extra Claims	Rate	Fee Totals
Basic Fee				\$690.00	\$690.00
Total Claims:	14	- 20	= 0	x \$18.00	= \$0.00
Independents:	4	- 3	= 1	x \$78.00	= \$78.00
If any Multiple Dependent Claim(s) present:			+	\$260.00	= \$0.00
Surcharge Under 37 C.F.R. §1.16(e):			+	\$130.00	= \$130.00
				SUBTOTAL:	= \$898.00
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- [X] The required filing fees are not enclosed but will be submitted in response to the Notice to File Missing Parts of Application.
- [] The Assistant Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Assistant Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741.

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TITLE OF THE INVENTION

IMAGE FORMING APPARATUS AND IMAGE PROCESSING APPARATUS
FOR PRINTING CODE PATTERN AND METHOD FOR PRINTING CODE
PATTERN

5 CROSS-REFERENCE TO RELATED APPLICATIONS

10 This application is based upon and claims the
benefit of priority from the prior Japanese Patent
Application No. 11-305593, filed October 27, 1999, the
entire contents of which are incorporated herein by
reference.

BACKGROUND OF THE INVENTION

15 The present invention relates to a method and
apparatus for printing electronic document data
containing a large amount of image data such as graphic
images on a sheet of paper, and restoring the original
electronic document data based on the data printed on
the sheet of paper.

20 There has been conventionally known an apparatus
for reading data printed on a paper sheet through a
scanner and creating electronic document data including
characters and images, for example, in order to reuse
the contents of the documents printed on the
distributed sheet of paper.

25 Jpn. Pat. Appln. KOKAI Publication No. 10-224540
discloses a digital copier which creates electronic
document data by recognizing code patterns which are
easy to read for computers such as griff code (Xerox

USA) and bar codes and printed on paper.

Such conventional systems however take a long time to recognize characters and still cannot recognize 100% of the letters. As a result, inaccurate electronic document data are created.

Moreover, if the print data to be converted to electronic data contain e.g. color images and thus the amounts of data are large, it may be difficult to print all the code patterns corresponding to the entire print data on e.g. the back of the sheet. In such a case, it is impossible to create electronic document data.

Thus, in a conventional arrangement, it is difficult to restore electronic document data if the print data containing e.g. color images and thus all the code patterns corresponding to the entire print data cannot be printed.

BRIEF SUMMARY OF THE INVENTION

An object of the present invention is to provide an image processing apparatus and a method which can restore electronic document data including image data such as color graphics and thus large in data size and thus makes it possible to raise the upper limit of the size of electronic document data as an original of paper document distributed.

According to the present invention, there is provided an image forming apparatus comprising: a controller for determining whether or not document data

given have a capacity larger than a first predetermined value; a first code pattern creating portion for creating code patterns by encoding the document data if the controller determines that the document data have a greater capacity than the first predetermined value; a
5 reducing portion for reducing the document data by a second predetermined value if the controller determines that the document data have a greater capacity than the first predetermined value; a second code pattern
10 creating portion for encoding the document data reduced by the reducing portion to create code patterns; and a print function for forming images on a recording medium based on the code patterns created by at least one of the first code pattern creating portion and the second
15 code pattern creating portion.

With this arrangement, even if document data including e.g. image data cannot be converted to printable code patterns because the document data are too large in size, the image data are deleted with only
20 the document data retained. Thus, it is possible to print only the document data on the front side of the sheet, and print code patterns such as bar codes corresponding to the document data on the back of the sheet.

25 From another aspect of the invention, there is provided an image forming apparatus comprising: a scanner for reading code patterns on a recording

medium; a creating portion for recognizing the code
patterns read by the scanner and creating temporary
document data based the code patterns; a controller
for determining whether or not predetermined image
5 data have been deleted based on the code patterns
recognized by the creating portion; a controller for
determining the temporary document data created by the
creating portion as final document data if the
controller determines that no data have been deleted
10 from the code patterns; and a supplementing portion for
restoring predetermined data from data other than the
code patterns and incorporating the restored
predetermined data into the temporary document data
created by the creating portion to restore the final
15 document data if the controller determines that the
predetermined data have been deleted from the code
patterns.

The present invention also provides an image
processing apparatus for reading the code patterns
20 printed on the back of the sheet of paper and judging
whether or not data such as image data have been
deleted when the code patterns are printed by the
abovementioned image forming apparatus. If image data
are determined to have been deleted, the images printed
25 on the front side of the sheet are read and
incorporated into the code patterns obtained from the
code patterns. With this arrangement, it is possible

to print or store even document data containing image data, which were heretofore been unhandlable, through code patterns such as bar codes.

5 The image forming apparatus and the image processing apparatus according to the present invention can be used for the image forming method and image processing method of the present invention.

10 Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

15 BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the invention, and together with the general description 20 given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the invention.

FIG. 1 is a block diagram schematically showing an image processing system according to an embodiment of 25 the present invention;

FIGS. 2A and 2B show an example of a paper document printed and output by the image processing

apparatus;

FIG. 3 shows an example of electronic document data;

FIG. 4 is a detailed block diagram of the image
5 processing apparatus;

FIG. 5 is a flowchart showing the printing processing of electronic document data in the image processing apparatus;

FIG. 6 is shows electronic document data with the
10 image data deleted; and

FIG. 7 is a flowchart showing the creating processing of electronic document data in the image processing apparatus.

DETAILED DESCRIPTION OF THE INVENTION

15 The embodiment of the invention is now described with reference to the drawings.

FIG. 1 schematically shows a configuration of an image processing system according to an embodiment of the present invention. The system comprises e.g. a
20 general-purpose computer (hereinafter simply referred to as "personal computer") 1, and an image processing device 2. They are connected together by a network 3.

The personal computer 1 creates electronic document data by activating a word processor based on
25 built-in application software, and also activates a display and the image processing device 2 to print data. The word processor of the personal computer 1 is not

described because it is already well-known in the art.

The image processing device 2 prints electronic document data created by the personal computer 1 on a printing medium, i.e. sheets of paper, and creates
5 electronic document data based on a printed paper document 4.

FIGS. 2A and 2B show an example of paper document 4 printed by the image processing device 2. FIG. 2A shows the front side, on which are printed human-
10 recognizable document data such as character data 5 and image data 6, e.g. color graphics. FIG. 2B shows the back side of the sheet, on which are printed code patterns 7 which can be recognized by the image processing device 2 to create electronic document data.
15 The code patterns 7 are e.g. one- or two-dimensional bar codes or griff code (trademark of Xerox USA).

While electronic document data are available in various formats, description is made here with reference to an example shown in FIG. 3. In this
20 example, the image portion (image data) consists of 20000×2000 pixels with each pixel representing one byte (256 colors). The data size of the image data portion is therefore 4 Mbytes. The data size of the other portions of the electronic document data is about
25 100 bytes. Thus, it will be appreciated that the image data portion (underlined portion of FIG. 3) of the image command practically represents the entire size of

the electronic document data.

The code patterns used in the embodiment are ones that can store 64-Kbyte data on an A4 sheet

FIG. 4 shows the detailed configuration of the
5 image processing device 2. It comprises an image
developing portion 11 as image developing means adapted
to be activated during printing of electronic document
data; a code pattern creating portion 12 as code
pattern creating portion for encoding the electronic
10 document data; electronic document data reducing
portion 13 as data reducing portion for reducing the
size of the electronic document data; a printing engine
14 as printing means for printing electronic document
data and code patterns by electrophotographic
15 processing on a paper sheet; a scanner 15 as image
scanner adapted to be activated when the electronic
document data are created; an electronic document
creating portion 16 as electronic document creating
portion for creating electronic document data, a code
20 pattern recognizing portion 17 as code pattern
recognizing means for recognizing the code patterns;
and an electronic document data supplementing portion
18 as electronic document data supplementing means for
supplementing data that has been reduced during
25 printing. And finally, a controller is provided in the
image forming device 2. The controller detects a
status of this system and determines various actions in

such a manner of the flowcharts shown in FIGS. 5 and 7.

How the image processing device 2 prints electronic document data is described with reference to the flowchart of FIG. 5. First, electronic document data 8 are developed into print images in the image developing portion 11. Specifically, in the example of FIG. 3, start of the page is recognized based on the page command; an image memory for developing print images corresponding to the sheet designated in the sheet command is retained; a font is selected based on the font command; character strings designated in the text command are drawn on the image memory retained; image data designated by the image command are developed in the image memory retained; and finally, the computer recognizes the completion of development of images based on the end command.

Then, the printing engine 14 prints images created in the image developing portion 11 on the sheet (S2).

In the next step (S3), the program compares the size of the electronic document data entered with a predetermined value (64 Kbytes in this embodiment) to check whether or not the code patterns corresponding to the electronic document data printed on the sheet can be entirely printed on the print area on the back of the sheet.

If the electronic document data size is 64 Kbytes or less, the corresponding code patterns are created in

the code pattern creating portion 12 by encoding the electronic document data as it is (S4) because the code patterns can be entirely printed on the print area. Then, the printing engine 14 prints the code pattern image thus created on the back of the sheet (S5).

If the program determines that the size of the electronic document data exceeds 64 Kbytes in Step S3, the electronic document data reducing portion 13 reduces the size of the electronic document data to the predetermined value to create temporary electronic document data which can be entirely printed on the print area (S6).

Specifically, in this embodiment, the reducing portion 13 deletes e.g. only the image data in the electronic document data to create temporary document data corresponding to the character data. In such a case, only the image data are deleted with the image command itself retained. That is, the position data (x, y, width and height) in the image command, which represent the position of the image data in the document data, are retained. In this embodiment, the size of the temporary document data is about 100 bytes, so that the code patterns corresponding to the temporary data can be printed in the print area. FIG. 6 shows such temporary electronic document data, which do not include image data.

The code pattern creating portion 12 encodes the

thus created temporary electronic document data to create code pattern images (S7). Finally, the print engine 14 prints the code pattern images on the back of the sheet (S5).

5 The flowchart of FIG. 7 shows how the image processing device 2 creates electronic document image. First, the scanner 15 reads the code patterns 7 printed on the back of the paper sheet 4 (S11), and transmits the data thus read to the electronic document image
10 creating portion 16. The latter then creates temporary electronic document data, that is, restore the original electronic document data by recognizing the code patterns read from the paper sheet 4 using the code pattern recognizing portion 12.

15 The electronic document creating portion 16 then determines whether or not the image command in the restored temporary electronic document data contains image data (S13). If there exist image data, which means that the electronic document data have been
20 printed entirely with no image data deleted, the temporary electronic document data are regarded as the ultimate electronic document data 8 (S14).

 If the electronic document creating portion 16 determines in Step S13 that there exist no image data,
25 which means that the image data have been deleted, the electronic document data supplementing portion 18 acquires image data by scanning the front side of the

paper sheet through the scanner 14 according to the position data (x, y, width and height) and parameters on the number of colors in the image command restored based on the code pattern read.

5 The image data thus acquired are incorporated into the temporary electronic document data to supplement the image data that have been deleted during printing, thereby creating the final electronic document data 8 (S16).

10 The electronic document data 8 thus created (restored) can be repeatedly printed by inputting the data 8 into the image developing portion 11 without the possibility of deterioration of the image quality. The data 8 may also be stored in an image memory (such as a
15 hard-disk device) (not shown) in the image processing device 2 for later used.

 The code patterns may be printed on an empty space on the front side of the sheet instead of on the back thereof or on a separate sheet. Also, the code
20 patterns may be printed with an invisible ink.

 In the embodiment, when data are printed, image data are deleted to reduce the size of the electronic document data to be converted to code patterns, and the image data thus deleted are added by scanning the front
25 side of the sheet based on the positional data of the image data in the code patterns read when the electronic document data are created.

But instead, the size of the electronic document data may be reduced in other ways, e.g. by reducing the resolution or the number of colors of the image data to be converted to code patterns or by downloading the
5 image data from a server on a separate network.

The present invention thus makes it possible to restore electronic document containing image data such as color graphics and thus large in data size and to relax the upper limit of the size of the electronic
10 document data that can be printed on a sheet of paper.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments
15 shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

WHAT IS CLAIMED IS:

1. An image forming apparatus comprising:
a controller for determining whether or not
document data given have a capacity larger than a first
5 predetermined value;

a first code pattern creating portion for creating
code patterns by encoding the document data, if the
controller determines that the document data have a
greater capacity than the first predetermined value;

10 a reducing portion for reducing the document data
by a second predetermined value, if the controller
determines that the document data have a greater
capacity than the first predetermined value;

a second code pattern creating portion for
15 encoding the document data reduced by the reducing
portion to create code patterns; and

a print function for forming images on a recording
medium based on the code patterns created by at least
one of the first code pattern creating portion and the
20 second code pattern creating portion.

2. An image forming apparatus according to
claim 1, wherein the print function includes

a function for forming images on the front side of
a recording medium based on the document data, and
25 forming the code patterns created by at least one of
the first code pattern creating portion and the second
code pattern creating portion.

3. An image forming apparatus according to claim 1, wherein the controller includes

5 control function for determining whether or not the document data have a capacity larger than the first predetermined value after an image developing portion has created print images based on the document data and a print engine has printed the print image on the front side of the recording medium.

10 4. An image forming apparatus according to claim 1, further comprising:

a scanner for reading the code patterns on the recording medium formed by the print function;

15 a creating portion for recognizing the code patterns read by the scanner, and creating temporary document data based on the code patterns;

a controller for determining whether or not there exist data deleted by the reducing portion based on the code patterns recognized by the creating portion;

20 a controller for determining the temporary document data as final document data, if the controller determines that no data has been deleted from the code patterns; and

25 a supplementing portion for acquiring predetermined data from data other than the code patterns and incorporating the predetermined data into the temporary document data created by the creating portion, if the controller determines that the predetermined data have

been deleted from the code patterns to restore the final document data.

5. An image forming apparatus according to claim 4, wherein the scanner includes

5 function for reading the code patterns formed on the back of the recording medium.

6. An image forming apparatus according to claim 4, wherein the supplementing portion includes

10 function for restoring the final document data by incorporating predetermined data restored by reading images formed on the front side of the recording through the print function into the temporary document data created by the creating portion.

7. An image forming apparatus comprising:

15 a scanner for reading code patterns on a recording medium;

a creating portion for recognizing the code patterns read by the scanner and creating temporary document data based the code patterns;

20 a controller for determining whether or not predetermined image data have been deleted based on the code patterns recognized by the creating portion;

a controller for determining the temporary document data created by the creating portion as final
25 document data, if the controller determines that no data have been deleted from the code patterns; and
a supplementing portion for restoring

predetermined data from data other than the code patterns and incorporating the restored predetermined data into the temporary document data created by the creating portion to restore the final document data, if
5 the controller determines that the predetermined data have been deleted from the code patterns.

8. An image forming method comprising:

a step of determining, by a controller, whether or not document data given have a capacity greater than a
10 first predetermined value;

a step of encoding the document data as it is to create code patterns by a code pattern creating portion, if the controller determines that the document data have a capacity not exceeding the first predetermined
15 value;

a step of reducing the document data by a second predetermined value by a reducing portion, if the controller determines the document data have a capacity greater than the first predetermined value;

20 a step of encoding the document data reduced by the reducing portion, by a code pattern creating portion to create code patterns; and

an image forming step of forming images by a print function on a recording medium based on the document
25 data and the code patterns created in the code pattern creating portion.

9. An image forming method according to claim 8,

wherein the image forming step includes

a step of forming images on the front side of the recording medium based on the document data, and forming the code patterns created in the code pattern creating portion on the back of the recording medium.

10. An image forming method according to claim 8, wherein the determining step includes

a step of creating images in an image developing portion based on the document data, printing the print images on the front side of the recording medium by the print function, and determining by a controller whether or not the document data have a capacity greater than the first predetermined value.

11. An image forming method according to claim 8, further comprising:

a reading step of reading the code patterns, by the scanner, formed on the recording medium by a print function;

a step of recognizing the code patterns read by the scanner and creating temporary document data based thereon by an electronic document creating portion;

a step of determining by the controller whether or not there exist data that have been deleted by the reducing portion based on the code patterns recognized by the creating portion;

a step of determining the temporary document data created by the creating portion as final document data,

if the controller determines that no data have been deleted from the code patterns; and

a restoring step of restoring predetermined data by a supplementing portion from data other than the code patterns and incorporating the thus restored predetermined data into the temporary document data created by the creating portion to restore the final document data, if the controller determines that the predetermined data have been deleted from the code patterns in the reducing portion.

12. An image forming method according to claim 11, wherein the reading step includes

a step of reading the code patterns, by the scanner, formed on the back of the recording medium by the print function.

13. An image forming apparatus according to claim 11, wherein the restoring step includes

a step of incorporating predetermined data restored by the supplementing portion, by means of reading the images formed on the front side of the recording medium by the scanner formed by the print function, into the temporary document data, so as to restore the final document data, if the controller determines that the predetermined data have been deleted from the code patterns by the reducing portion.

14. An image forming apparatus comprising:

a step of reading code patterns on a recording

medium by a scanner;

a step of recognizing the code patterns read by the scanner and creating temporary document data by a creating portion based thereon;

5 a step of determining by a controller whether or not predetermined image data have been deleted based on the code patterns;

10 a step of determining the temporary document data created by the creating portion as final document data, if the controller determines that that no data have been deleted from the code patterns by a reducing portion; and

15 a step of restoring predetermined data from data other than the code patterns and incorporating the thus restored data into the temporary document data created by the creating portion to restore the final document data by the supplementing portion, if the controller determines the predetermined data have been reduced from the code patterns.

ABSTRACT OF THE DISCLOSURE

An image forming apparatus includes a creating portion for determining whether or not document data give have a capacity greater than a first predetermined value, and creating code patterns by encoding the document data as it is, if the controller determines that the document data have a capacity smaller than the first predetermined value, a creating portion for reducing the document data by a second predetermined value and creating code patterns by encoding the thus reduced document data, if the controller determines that the document data have a capacity greater than the first predetermined value, and an printing engine for forming the thus created code patterns and the document data on a sheet of paper. With this arrangement, it is possible to print even large-capacity document data on the back of the sheet of paper in the form of code patterns.

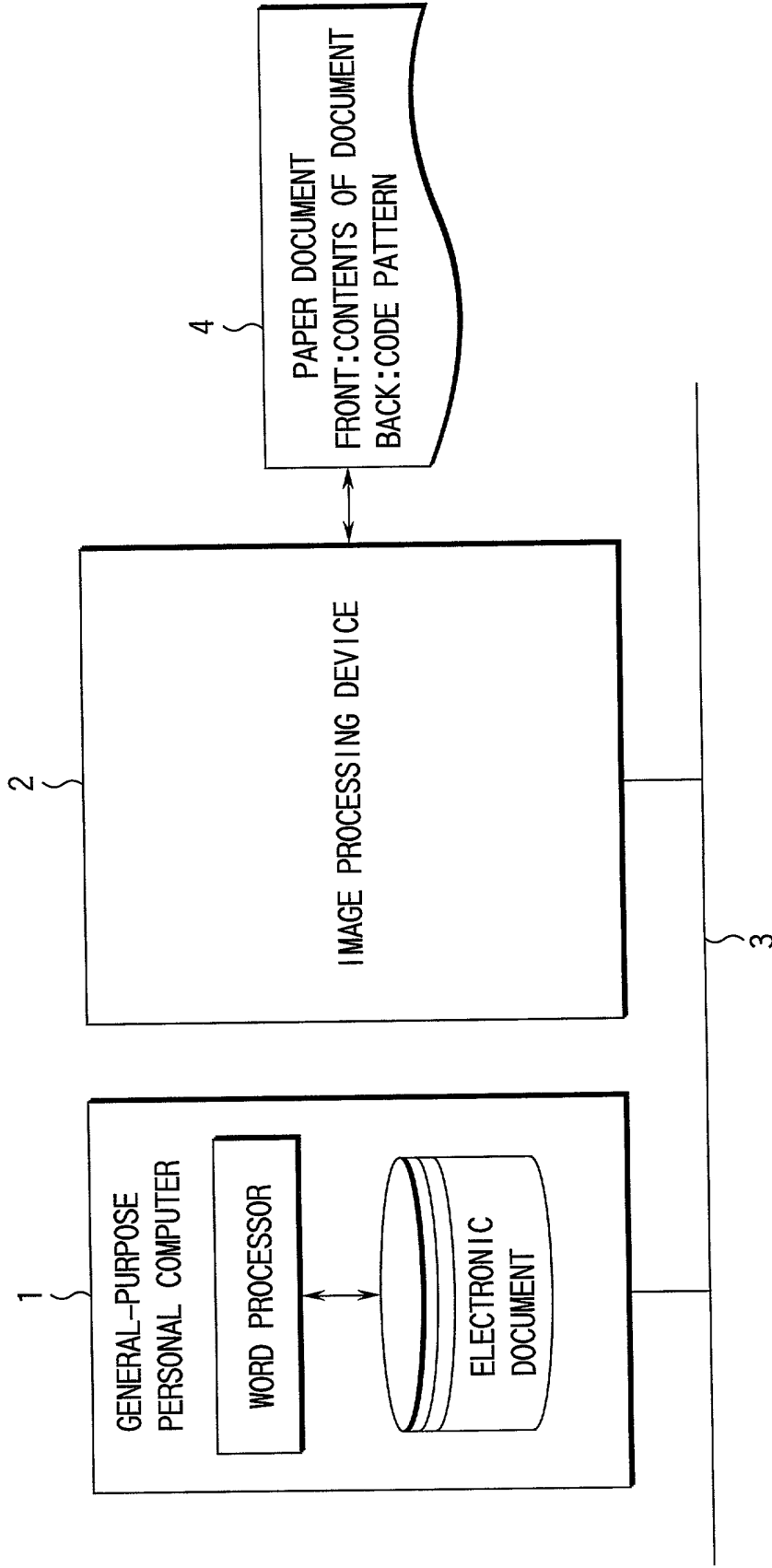


FIG. 1

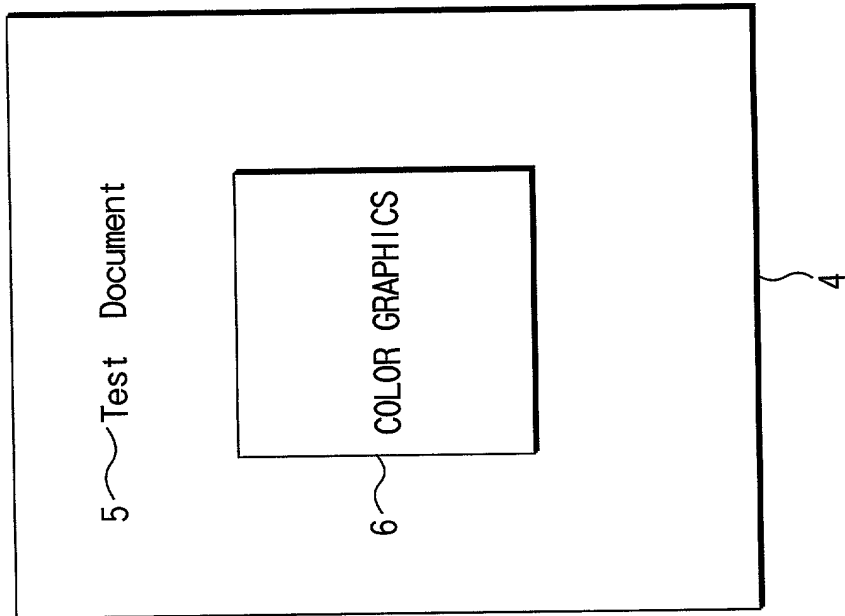


FIG. 2A

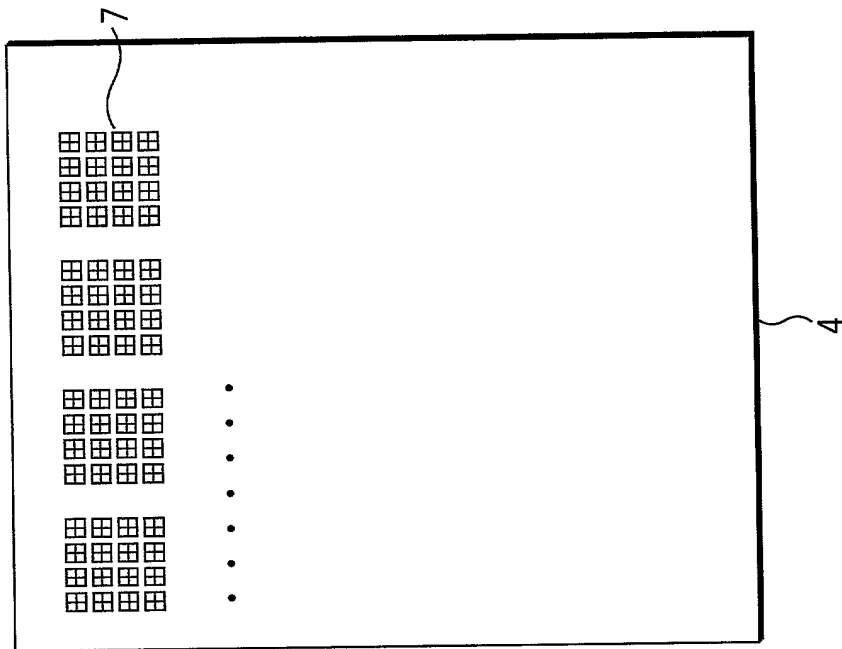


FIG. 2B

```

page
sheet,A4,(3000,4000)
font,times,12,black
text,(150,100),"Test Document"
image,(100,200,2000,256,0x0A8...0 //IMAGE:REGION(x,y,width,height),NUMBER OF COLORS,
                                     image-data
                                     //END OF PAGE
end

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FIG. 3

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page
sheet,A4,(3000,4000)
font,times,12,black
text,(150,100),"Test Document"
image,(100,200,2000,256
                                     //START OF PAGE
                                     //SHEET:SIZE,NUMBER OF PIXELS(x,y)
                                     //FONT:NAME,POINT,COLOR
                                     //CHARACTER STRING;DRAWING POSITION(x,y),
                                     "CHARACTER STRING"
                                     //IMAGE:REGION(x,y,width,height),NUMBER OF COLORS
                                     //END OF PAGE
end

```

FIG. 6

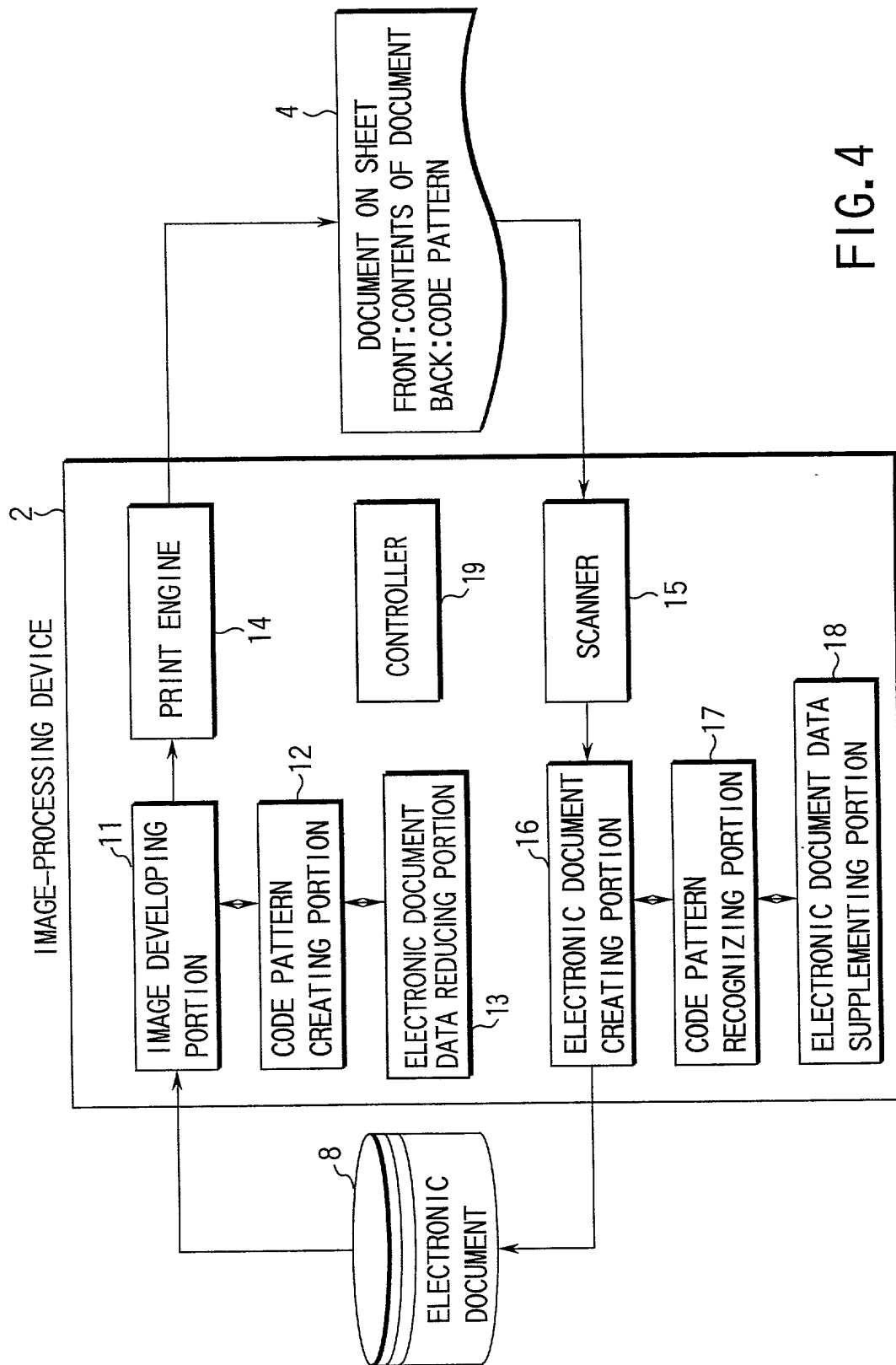


FIG. 4

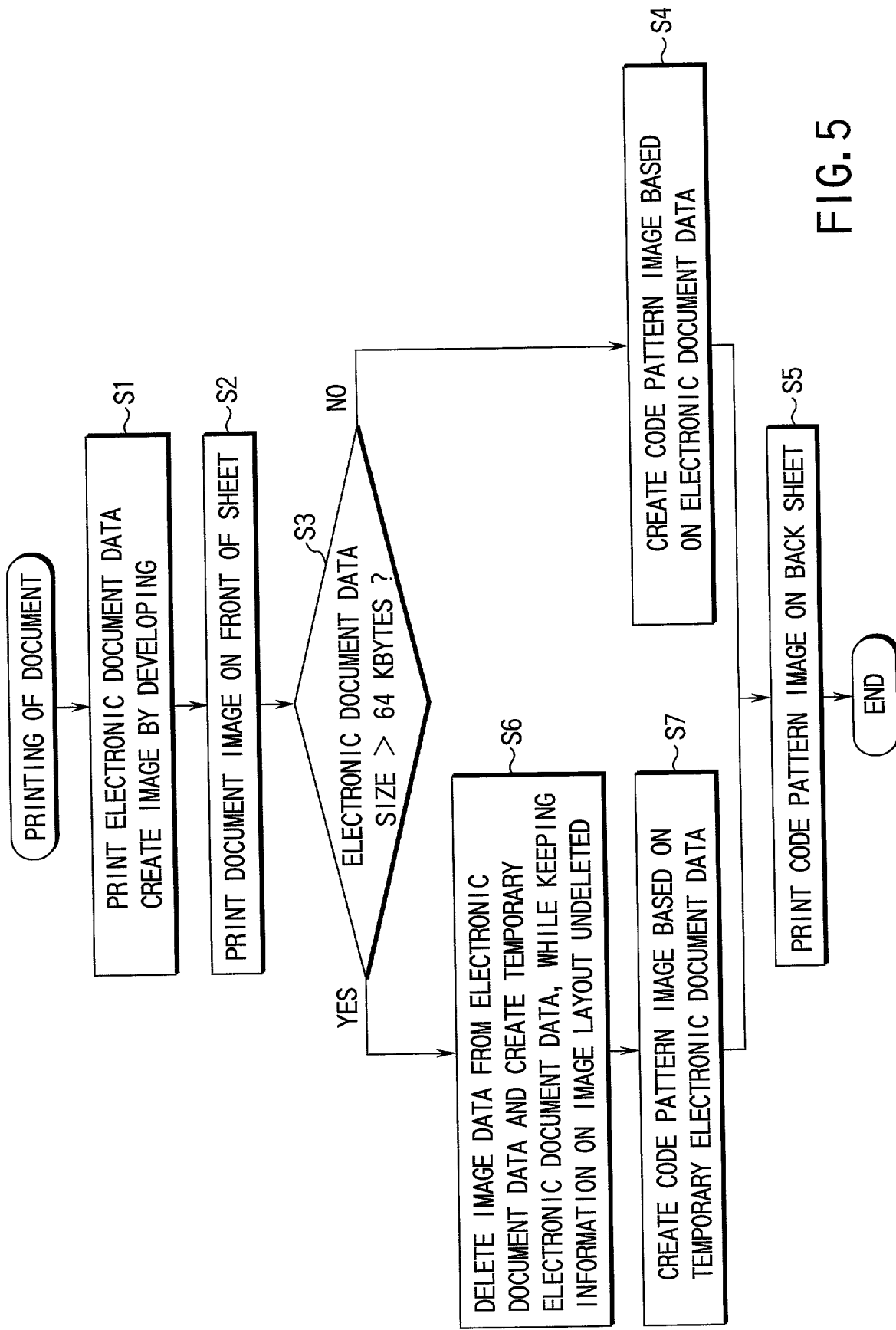


FIG. 5

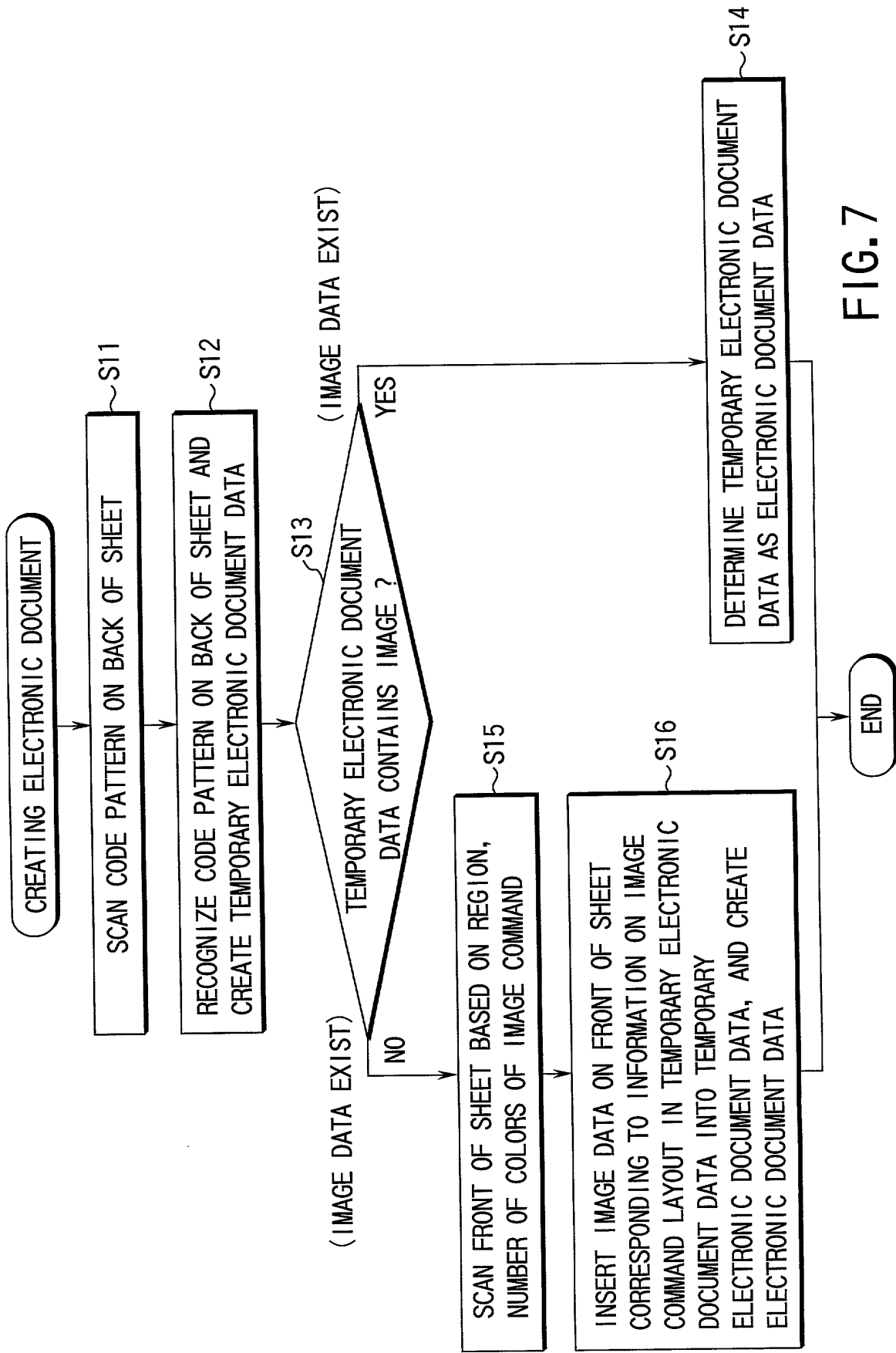


FIG. 7

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I HEREBY DECLARE:

THAT my residence, post office address, and citizenship are as stated below next to my name;

THAT I believe I am the original, first, and sole inventor (if only one inventor is named below) or an original, first, and joint inventor (if plural inventors are named below or in an attached Declaration) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**IMAGE FORMING APPARATUS AND IMAGE PROCESSING APPARATUS FOR PRINTING
CODE PATTERN AND METHOD FOR PRINTING CODE PATTERN**

(Attorney Docket No. 016907/1145)

the specification of which (check one)

___ is attached hereto.

X was filed on September 19, 2000 as United States Application
Number or PCT International Application Number ___
and was amended on _____ (if applicable).

THAT I do not know and do not believe that the same invention was ever known or used by others in the United States of America, or was patented or described in any printed publication in any country, before I (we) invented it;

THAT I do not know and do not believe that the same invention was patented or described in any printed publication in any country, or in public use or on sale in the United States of America, for more than one year prior to the filing date of this United States application;

THAT I do not know and do not believe that the same invention was first patented or made the subject of an inventor's certificate that issued in any country foreign to the United States of America before the filing date of this United States application if the foreign application was filed by me (us), or by my (our) legal representatives or assigns, more than twelve months (six months for design patents) prior to the filing date of this United States application;

THAT I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment specifically referred to above;

THAT I believe that the above-identified specification contains a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention, and sets forth the best mode contemplated by me of carrying out the invention; and

THAT I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I HEREBY CLAIM foreign priority benefits under Title 35, United States Code § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number	Country	Foreign Filing Date	Priority Claimed?	Certified Copy Attached?
11-305593	Japan	October 27, 1999	yes	

I HEREBY CLAIM the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

U.S. Provisional Application Number	Filing Date

I HEREBY CLAIM the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Application Number	Parent Filing Date	Parent Patent Number

I HEREBY APPOINT the following registered attorneys and agents of the law firm of FOLEY & LARDNER to have full power to prosecute this application and any continuations, divisions, reissues, and reexaminations thereof, to receive the patent, and to transact all business in the United States Patent and Trademark Office connected therewith:

STEPHEN A. BENT	Reg. No. 29,768
DAVID A. BLUMENTHAL	Reg. No. 26,257
BETH A. BURROUS	Reg. No. 35,087
ALAN I. CANTOR	Reg. No. 28,163
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I UNDERSTAND AND AGREE THAT the foregoing attorneys and agents appointed by me to prosecute this application do not personally represent me or my legal interests, but instead represent the interests of the legal owner(s) of the invention described in this application.

I FURTHER DECLARE THAT all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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